

86/TZ/80
JCS60 U.S. PATENTS
RECEIVED
MAY 21 1998

ROYSTON, RAYZOR, VICKERY, NOVAK & DRUCE, L.L.P.

ATTORNEYS AT LAW

2000 RIVERVIEW TOWERS • 111 SOLEDAD • SAN ANTONIO, TEXAS 78205
TELEPHONE 210-228-0655
TELEX NO. 6869017 • FACSIMILE NO. 210-228-0839
INTERNET FIRM@NOVAKDRUCE.COM

ROYSTON OFFICE
ROYSTON, RAYZOR,
VICKERY & WILLIAMS, LLP.
2200 TEXAS COMMERCE TOWER
600 TRAVIS STREET
HOUSTON, TX 77002-2913
TELEPHONE NO. 713-225-8380
TELEX NO. 6869017
FACSIMILE NO. 713-225-9455

BROWNSVILLE OFFICE
ROYSTON, RAYZOR,
VICKERY & WILLIAMS, LLP.
55 COVE CIRCLE
P.O. BOX 3509
BROWNSVILLE, TX 78523-3509
TELEPHONE 956-542-4377
TELEX NO. 6869017
FACSIMILE NO. 956-542-4370

CORPUS CHRISTI OFFICE
ROYSTON, RAYZOR,
VICKERY & WILLIAMS, LLP.
1700 WILSON PLAZA WEST
606 N. CARANCAHUAM
CORPUS CHRISTI, TX 78476
TELEPHONE 512-364-8806
TELEX NO. 6869017
FACSIMILE NO. 512-884-7261

GALVESTON OFFICE
ROYSTON, RAYZOR,
VICKERY & WILLIAMS, LLP.
205 COTTON EXCHANGE BLDG
GALVESTON, TEXAS 77550
TELEPHONE 409-763-1623
TELEX NO. 6869017
FACSIMILE NO. 409-763-3853

LUBBOCK OFFICE
ROYSTON, RAYZOR, VICKERY,
NOVAK & DRUCE, LLP.
1402 TEXAS AVENUE
LUBBOCK, TX 79401
TELEPHONE 806-763-9252
FACSIMILE NO. 806-763-9254

JCS60 U.S. PATENTS
RECEIVED
OCT 21 1998
TELEX NO. 6869017

August 21, 1998

PATENTS

Box PATENT APPLICATION
Assistant Commissioner for Patents
Washington, D.C. 20231

Re: Serial Number Unknown
Filing Date August 21, 1998
Invention Title DEVICE AND METHOD FOR PROTECTION OF HEATING
VENTILATION AND AIR CONDITIONING CONTROL
CIRCUITS FROM OVERCURRENTS
Inventor(s) MITCHELL, Dennis
Attorney Docket No.: 19570.44353

Dear Sir:

Enclosed herewith for filing, please find the following:

1. New Patent Application: 6 pgs. specs, 10 pgs. claims, and an abstract;
2. Five (5) sheets of drawings;
3. Declaration and Power of Attorney;
4. Small Entity Statement (Inventor);
5. Information Disclosure Statement, Form PTO-1449 and cited references; and
6. Addressed Postcard to be returned upon receipt.

CERTIFICATE OF MAILING BY "EXPRESS MAIL"

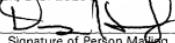
"Express Mail" Mailing Label Number EM152819399US

Date of Deposit August 21, 1998.

I hereby certify that this paper or fee is being deposited with the United States Postal Service "Express Mail Post Office to Addressee" service under 37 C.F.R. § 1.10 on the date indicated above and is addressed to: Box Patent Application, Assistant Commissioner of Patents, Washington, D.C. 20231.

8/21/98

Date


Signature of Person Mailing

Daniel Hernandez
Printed Name of Person Mailing

ROYSTON, RAYZOR, VICKERY, NOVAK & DRUCE, L.L.P.

No fee is required with this filing.

Please charge Deposit Account No. 50-0432 in the amount of \$ 395.00. A
COPY OF THIS LETTER IS ATTACHED.

The Commissioner is hereby authorized to charge any additional fees under 37 C.F.R. §§ 1.16 and 1.17 which may be required at any time during the prosecution of this application without specific authorization, or credit any overpayment to Deposit Account No. 50-0432.

Dated: 21 Aug '98

**ROYSTON, RAYZOR, VICKERY,
NOVAK & DRUCE, L.L.P.**
2000 Riverview Towers
111 Soledad
San Antonio, Texas 78205
Telephone 210 228 0655
Telecopier 210 228 0839

Josephine

Tracy W. Druce
Attorney for Applicant
Registration No. 35,493

C:\CLIENTS\RH\1900\1957.002\info-cov(util-app).wad

DEVICE AND METHOD
FOR PROTECTION
OF HEATING VENTILATION AND AIR CONDITIONING CONTROL CIRCUITS
FROM OVERCURRENTS

Inventor: Dennis Mitchell
12127 Jones Maltsberger
San Antonio, Texas 78247

(U.S. Citizen)

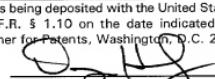
Attorney Docket No.: 19570.44353

CERTIFICATE OF MAILING BY "EXPRESS MAIL"

"Express Mail" Mailing Label Number EM152819399US Date of Deposit August 21, 1998.
I hereby certify that this paper or fee is being deposited with the United States Postal Service "Express Mail Post Office to Addressee" service under 37 C.F.R. § 1.10 on the date indicated above and is addressed to: Box PATENT APPLICATION, Assistant Commissioner for Patents, Washington, D.C. 20231.

8/21/98

Date


Signature of Person Mailing

Daniel Hernandez
Printed Name of Person Mailing

DEVICE AND METHOD
FOR PROTECTION
OF HEATING VENTILATION AND AIR CONDITIONING CONTROL CIRCUITS
FROM OVERCURRENTS

FIELD OF THE INVENTION:

This invention relates generally to overcurrent protection for electrical circuits.

10 Specifically, this invention relates to positive temperature coefficient (PTC) overcurrent protection for heating, ventilation, and air conditioning (HVAC) control circuits.

BACKGROUND INFORMATION:

Circuit protection devices in HVAC control applications are well known. HVAC control

15 circuits contain elements which may be harmed by overcurrents. Conventional fuses were developed to protect such elements by creating an open circuit in response to an overcurrent, but suffer from the drawback of being single-use devices. Once an open circuit is created in the fuse element, the fuse must be replaced. This deficiency was addressed with the invention of conventional circuit breakers. However, circuit breakers typically must be manually reset
20 after "tripping"; where "tripping" is defined as creating an open circuit or limiting the current in the circuit to a minimal, non-damaging value. Both fuses and circuit breakers are oftentimes located in places which are difficult or dangerous for service personnel to access. Additionally, circuit breakers are prone to failure modes typically associated with mechanical devices. Further, circuit breakers are typically bulky items compared to fuses.

25 PTC materials, specifically polymer-based PTC materials, exhibit characteristics which offer advantages over both conventional fuses and circuit breakers. PTC materials behave such that a steady state trip current, I_{trip} , through PTC material which will cause the material to "trip" can be chosen to be less than the maximum current carrying capacity, I_{max} , of an HVAC control circuit to be protected and greater than a combined load current, I_{load} , drawn by all loads

in the HVAC control circuit; where I_{max} is greater than I_{load} . Similar characteristics can generally be found in both fuses and circuit breakers.

Upon encountering a current greater than I_{trip} , the resistance of PTC material increases to limit current to a steady-state value that can be chosen to be substantially lower than I_{trip} , I_{load} .

5 or I_{max} . Unlike fuses or circuit breakers, removal of conditions which caused the PTC material to "trip" causes the material to return to a state allowing currents up to I_{trip} to be conducted. Unlike fuse material, PTC material may be reused. Unlike circuit breakers, a PTC material-based device does not require service personnel or the user to access the device to reset it. PTC materials sufficient to provide overcurrent protection in HVAC control circuits are typically

10 much less bulky than comparable circuit breakers. Current state of the art includes PTC materials which have a voltage rating commensurate with that required by HVAC control circuits.

Therefore, in view of the need for multi-use, non-bulky, HVAC control circuit overcurrent protection which can be reset without the user having access to the device and the potential

15 benefits to be enjoyed in addressing the drawbacks of conventional circuit protection devices used in HVAC control circuits, the present invention has been designed and developed.

SUMMARY OF THE INVENTION:

The present invention includes features and components that have been invented and

20 selected for their individual and combined benefits and superior performance. The invention includes a circuit protection device for protecting an HVAC control circuits from overcurrents and methods for employing the circuit protection device.

Each of the several embodiments of the invention described herein includes a PTC member. In addition, each of several embodiments described herein includes a pair of

25 connective members, arranged so that the PTC member is disposed therebetween and in electrical contact therewith. The connective members provide the necessary external electrical interface for the circuit protection device. Each embodiment also includes a protective member

covering portions of the PTC member and the connective members. The protective member is chosen or constructed to insulate a user from contact with electrical hazard when the circuit protection device is installed. The same protective member is also designed to shield the circuit protection device from electrical and physical contact which would affect its performance or the
5 performance of the HVAC control circuit within which it is included.

In one alternative embodiment, the connective members are configured as a pair of substantially parallel coplanar blades electrically and mechanically compatible with common blade-type fuse receptacles found in HVAC control circuits. In a further alternative embodiment, the connective members are configured as a pair of end caps at opposite ends of an insulating

- 10 protective member to be electrically and mechanically compatible with common cartridge-type fuse receptacles commonly found in HVAC control circuits. In yet another alternative embodiment, the invention includes connective members configured as a pair of insulated lead wires of sufficient length to allow a tradesman skilled in the art to splice the circuit protection device into an HVAC control circuit to be protected. In yet another alternative embodiment of
- 15 the present invention, the connective members and the protective member are collectively configured to be electrically and mechanically compatible with common screw-type fuse receptacles found in HVAC control circuits.

The invention also includes four methods for protecting an HVAC control circuit from overcurrents. These methods generally consist of the steps of (1) providing a circuit protection
20 device of the present invention and (2) installing the device in the circuit to be protected in a fashion appropriate to its construction.

DESCRIPTION OF THE DRAWINGS AND ILLUSTRATIVE PHOTOGRAPHS:

Figure 1 is an exploded perspective view of a preferred embodiment of the present
25 invention configured to be electrically and mechanically compatible with common blade-type fuse receptacles found in HVAC control circuits.

Figure 2 is a front elevational view of a preferred embodiment of the present invention configured to be electrically and mechanically compatible with common blade-type fuse receptacles found in HVAC control circuits.

Figure 3 is a side elevational view of a preferred embodiment of the present invention
5 configured to be electrically and mechanically compatible with common blade-type fuse receptacles found in HVAC control circuits.

Figure 4 is a perspective view of an alternative embodiment of the present invention configured to be electrically and mechanically compatible with common cartridge-type fuse receptacles found in HVAC control circuits.

10 Figure 5 is a front elevational view of an alternative embodiment of the present invention configured to be electrically and mechanically compatible with common cartridge-type fuse receptacles found in HVAC control circuits.

Figure 6 is a side elevational view of an alternative embodiment of the present invention configured to be electrically and mechanically compatible with common cartridge-type fuse
15 receptacles found in HVAC control circuits.

Figure 7 is a perspective view of an alternative embodiment of the present invention configured to be electrically and mechanically compatible with common screw-type fuse receptacles found in HVAC control circuits.

Figure 8 is an elevational view of an alternative embodiment of the present invention
20 configured to be electrically and mechanically compatible with common screw-type fuse receptacles found in HVAC control circuits.

Figure 9 is an elevational view of an alternative embodiment of the present invention where the connective members are insulated wires of sufficient length to allow a tradesman skilled in the art to splice the circuit protection device into an HVAC control circuit.

DESCRIPTION OF THE INVENTION:

Based on the description and illustrations provided herein, the many benefits provided by the invented structure and methods of utilization are apparent. These described benefits, as well as those that are inherent to those skilled in the art, fall within the scope of the invention

5 of the present patent application as limited only by the claims appended hereto.

Referring to Figures 1 - 9, each alternative embodiment of the HVAC control circuit protection device 100, 200, 300, 400 consists of a PTC member 110, 210, 310, 410; a pair of connective members 120, 130, 220, 230, 320, 330, 420, 430 and a protective member 140, 240, 340, 440. In each embodiment of the device 100, 200, 300, 400 described herein, the

10 PTC member 110, 210, 310, 410 is radially leaded and disposed electrically between pairs of connective members 120 & 130, 220 & 230, 320 & 330, 420 & 430. Further, in each embodiment of the device 100, 200, 300, 400 described herein, the protective member 140, 240, 340, 440 serves to protect a user from contact with electrical hazard when the device 100, 200, 300, 400 is installed and to protect the device 100, 200, 300, 400 from electrical and
15 mechanical hazard which would affect its performance or the performance of the HVAC control circuit to be protected.

Referring to Figures 1 - 3, a preferred embodiment of the HVAC control circuit protection device 100 is shown. Here, the PTC member 110 is disposed electrically between a pair of substantially co-planar and substantially parallel connective members 120, 130. The connective
20 members 120, 130 provide the external electrical interface of the HVAC control circuit protection device 100 and are formed and arranged to be electrically and mechanically compatible with blade-type fuse receptacles commonly found in HVAC control circuits. The non-conductive protective member 140 of this embodiment is formed by two substantially similar halves which are joined to substantially cover the PTC member 110 and partially cover the connective
25 members 120, 130. In addition, the protective member 140 contributes to the structural integrity of the device 100 through a plurality of posts 142 and recesses 144 which mate through a plurality of holes 125 in the connective members 120, 130.

Referring to Figures 4 - 6, an alternative embodiment of the present invention is shown. In this embodiment, the connective members 220, 230 are conductive end caps disposed at opposite ends of a nonconductive protective member 240. The non-conductive protective member 240 substantially covers the PTC member's 210 conductive leads 212, 213 which 5 connect electrically to the end caps 220, 230. The entire device 200 is electrically and mechanically compatible with cartridge-type fuse receptacles commonly found in HVAC control circuits.

Referring to Figures 7 and 8, a further alternative embodiment of the present invention is shown. In this embodiment, one connective member 320 is formed and disposed as the base 10 of a screw-type circuit protection device commonly found in HVAC control circuits. The other connective member 330 is formed and disposed as the threads of such a screw-type circuit protection device. The non-conductive protective member 340 of the device 300 covers the PTC member 310 and supports and electrically isolates the connective members 320, 330. The entire device 300 is electrically and mechanically compatible with screw-type fuse receptacles 15 commonly used in HVAC control circuits.

Referring to Figure 9, a further alternative embodiment of the present invention is shown. In this embodiment of the device 400, each of the connective members 420, 430 is an insulated conductor of sufficient length to allow a tradesman skilled in the art to splice the device 400 into an HVAC control circuit. The protective member 440 is configured as insulating 20 heat shrink tubing or electrical tape to cover the PTC member's leads and the junction between the PTC member 410 and the connective members 420, 430.

CLAIMS.

What is claimed and desired to be secured by Letters Patent is as follows:

1. A circuit protection device for protecting an HVAC control circuit from overcurrents, said device comprising:

a PTC member, said PTC member configured for installation in an HVAC control circuit and adapted so:

a steady state trip current, I_{trip} , through said PTC member which will cause said PTC member to trip is less than a maximum current carrying capacity, I_{max} , of an HVAC control circuit to be protected and is greater than a combined load current, I_{load} , drawn by all loads in said HVAC control circuit to be protected during normal operation;

the resistance of said PTC member increases upon tripping to limit current in said HVAC control circuit to be protected to a steady state value substantially lower than I_{trip} , I_{load} , and I_{max} ;

said PTC member returns to a state allowing I_{load} to be conducted in said HVAC control circuit to be protected upon removal of conditions which caused said PTC member to trip; and

said PTC member has a voltage rating commensurate with other elements in the HVAC control circuit to be protected;

a pair of connective members configured so that said PTC member is disposed between and in electrical contact with said connective members, so that said connective members provide an external electrical interface for said circuit protection device; and

a protective member at least partially covering said PTC member and said connective members, said protective member adapted to insulate a user from contact with electrical hazard when said circuit protection device is installed in an HVAC control circuit to be protected thereby and to protect said circuit protection device from performance-affecting electrical and physical contact during use.

RECEIVED
PATENT AND TRADEMARK OFFICE
MAY 10 2013

2. The invention as recited in Claim 1 wherein said connective members are configured as a pair of parallel coplanar blades electrically and mechanically compatible with a blade-type fuse receptacles of an HVAC control circuit.
3. The invention as recited in Claim 1 said wherein said connective members comprise a pair of insulated lead wires of sufficient length to allow a tradesman skilled in the art to splice said circuit protection device into an HVAC control circuit to be protected.
4. The invention as recited in Claim 1, wherein said connective members and said protective member are configured to be electrically and mechanically compatible with a screw-type fuse receptacle of an HVAC control circuit.
5. The invention as recited in Claim 1, wherein said connective members and said protective member are configured to be electrically and mechanically compatible with a cartridge-type fuse receptacle of an HVAC control circuit.
6. A method for protecting a heating, ventilation, and air conditioning control circuit from overcurrents comprising the steps of:
 - providing a circuit protection device for protecting an HVAC control circuit from overcurrents, said device comprising:

a PTC member, said PTC member configured for installation in an HVAC control circuit and adapted so:

a steady state trip current, I_{trip} , through said PTC member which will cause said PTC member to trip is less than a maximum current carrying capacity, I_{max} , of an HVAC control circuit to be protected and is greater than a combined load current, I_{load} , drawn by all loads in said HVAC control circuit to be protected during normal operation;

the resistance of said PTC member increases upon tripping to limit current in said HVAC control circuit to be protected to a steady state value substantially lower than I_{trip} , I_{load} , and I_{max} ;

said PTC member returns to a state allowing I_{load} to be conducted in said HVAC control circuit to be protected upon removal of conditions which caused said PTC member to trip; and

said PTC member has a voltage rating commensurate with other elements in the HVAC control circuit to be protected;

a pair of connective members configured so that said PTC member is disposed between and in electrical contact with said connective members, so that said connective members provide an external electrical interface for said circuit protection device, said connective members configured as a pair of parallel coplanar blades electrically and mechanically compatible with common blade-type fuse receptacles found in HVAC control circuits,

a protective member at least partially covering said PTC member and said connective members, said protective member adapted to insulate a user from contact with electrical hazard when said circuit protection device is installed in an HVAC control circuit to be protected thereby and to protect said circuit protection device from performance-affecting electrical and physical contact during use,

removing any existing overcurrent protection device from a blade-type fuse receptacle of said HVAC control circuit to be protected,

inserting the said circuit protection device into said blade-type fuse receptacle of said HVAC control circuit thereby protecting said HVAC control circuit from overcurrent conditions.

7. A method for protecting a heating, ventilation, and air conditioning control circuit from overcurrents comprising the steps of:

providing a circuit protection device for protecting an HVAC control circuit from overcurrents, said device comprising:

a PTC member, said PTC member configured for installation in an HVAC control circuit and adapted so:

a steady state trip current, I_{trip} , through said PTC member which will cause said PTC member to trip is less than a maximum current carrying capacity, I_{max} , of an HVAC control circuit to be protected and is greater than a combined load current, I_{load} , drawn by all loads in said HVAC control circuit to be protected during normal operation;

the resistance of said PTC member increases upon tripping to limit current in said HVAC control circuit to be protected to a steady state value substantially lower than I_{trip} , I_{load} , and I_{max} ;

said PTC member returns to a state allowing I_{load} to be conducted in said HVAC control circuit to be protected upon removal of conditions which caused said PTC member to trip; and

said PTC member has a voltage rating commensurate with other elements in the HVAC control circuit to be protected;

a pair of connective members configured so that said PTC member is disposed between and in electrical contact with said connective members, so that said connective members provide an external electrical interface for said circuit protection device, said connective members comprise a pair of insulated lead wires of sufficient length to allow a tradesman skilled in the art to splice said circuit protection device into an HVAC control circuit to be protected.

a protective member at least partially covering said PTC member and said connective members, said protective member adapted to insulate a user from contact with electrical hazard when said circuit protection device is installed in an HVAC control circuit to be protected thereby and to protect said circuit protection device from performance-affecting electrical and physical contact during use,

splicing said circuit protection device into a circuit to be protected, said circuit protection device spliced in series with an electrical power source of the circuit to be protected and an impedance representative of the cumulative load of the circuit to be protected.

8. A method for protecting a heating, ventilation, and air conditioning control circuit from overcurrents comprising the steps of:

providing a circuit protection device for protecting an HVAC control circuit from overcurrents, said device comprising:

a PTC member, said PTC member configured for installation in an HVAC control circuit and adapted so:

a steady state trip current, I_{trip} , through said PTC member which will cause said PTC member to trip is less than a maximum current carrying capacity, I_{max} , of an HVAC control circuit to be protected and is greater than a combined load current, I_{load} , drawn by all loads in said HVAC control circuit to be protected during normal operation;

the resistance of said PTC member increases upon tripping to limit current in said HVAC control circuit to be protected to a steady state value substantially lower than I_{trip} , I_{load} , and I_{max} ;

said PTC member returns to a state allowing I_{load} to be conducted in said HVAC control circuit to be protected upon removal of conditions which caused said PTC member to trip; and

said PTC member has a voltage rating commensurate with other elements in the HVAC control circuit to be protected;

a pair of connective members configured so that said PTC member is disposed between and in electrical contact with said connective members, so that said connective members provide an external electrical interface for said circuit protection device,

a protective member at least partially covering said PTC member and said connective members, said protective member adapted to insulate a user from contact with electrical hazard when said circuit protection device is installed in an HVAC control circuit to be protected thereby and to protect said circuit protection device from performance-affecting electrical and physical contact during use,

said connective members and said protective member are configured electrically and mechanically compatible with common screw-type fuse receptacles found in HVAC control circuits,

removing any existing overcurrent protection device from a screw-type fuse receptacle of said HVAC control circuit to be protected,

screwing the said circuit protection device into the screw-type fuse receptacle of said HVAC control circuit thereby protecting said HVAC control circuit from overcurrent conditions.

9. A method for protecting a heating, ventilation, and air conditioning control circuit from overcurrents comprising the steps of:

providing a circuit protection device for protecting an HVAC control circuit from overcurrents, said device comprising:

a PTC member, said PTC member configured for installation in an HVAC control circuit and adapted so:

a steady state trip current, I_{trip} , through said PTC member which will cause said PTC member to trip is less than a maximum current carrying capacity, I_{max} , of an HVAC control circuit to be protected and is greater than a combined load current, I_{load} , drawn by all loads in said HVAC control circuit to be protected during normal operation;

the resistance of said PTC member increases upon tripping to limit current in said HVAC control circuit to be protected to a steady state value substantially lower than I_{trip} , I_{load} , and I_{max} ;

said PTC member returns to a state allowing I_{load} to be conducted in said HVAC control circuit to be protected upon removal of conditions which caused said PTC member to trip; and

said PTC member has a voltage rating commensurate with other elements in the HVAC control circuit to be protected;

a pair of connective members configured so that said PTC member is disposed between and in electrical contact with said connective members, so that said connective members provide an external electrical interface for said circuit protection device,

a protective member at least partially covering said PTC member and said connective members, said protective member adapted to insulate a user from contact with electrical hazard when said circuit protection device is installed in an HVAC control circuit to be protected thereby and to protect said circuit protection device from performance-affecting electrical and physical contact during use,

said connective members and said protective member are configured to be electrically and mechanically compatible with a cartridge-type fuse receptacles of said HVAC control circuit to be protected,

removing any existing overcurrent protection device from a cartridge-type fuse receptacle of said HVAC control circuit to be protected,

inserting said circuit protection device into said cartridge-type fuse receptacle of said HVAC control circuit thereby protecting said HVAC control circuit from overcurrent conditions.

ABSTRACT

A device and method for protection of heating, ventilation, and air conditioning (HVAC) control circuits. The device includes a positive temperature coefficient (PTC) member which is a multi-use, non-bulky, element which will reset after tripping without requiring the user to access the device. The device also includes a pair of connective members to provide the external electrical interface for the device, such that the PTC member is disposed between and in electrical contact with the connective members. Each embodiment also includes a protective member covering portions of the PTC member and connective members chosen or formed sufficient to insulate a user from contact with electrical hazard and sufficient to protect the device from electrical and physical contact which would affect its performance or the performance of the HVAC control circuit to be protected. In alternative embodiments the connective members are configured as either a pair of parallel coplanar blades electrically and mechanically compatible with common blade-type fuse receptacles found in HVAC control circuits, a pair of insulated lead wires of sufficient length to allow a tradesman skilled in the art to splice the circuit protection device into an HVAC control circuit to be protected. In a further alternative embodiment of the present invention, the connective members and the protective member are collectively configured electrically and mechanically compatible with common screw-type fuse receptacles found in HVAC control circuits. The invention also includes three methods for protecting an HVAC control circuit from overcurrents. These methods generally consist of the steps of (1) providing a circuit protection device of the present invention and (2) installing the device in the circuit to be protected in a fashion appropriate to its construction.

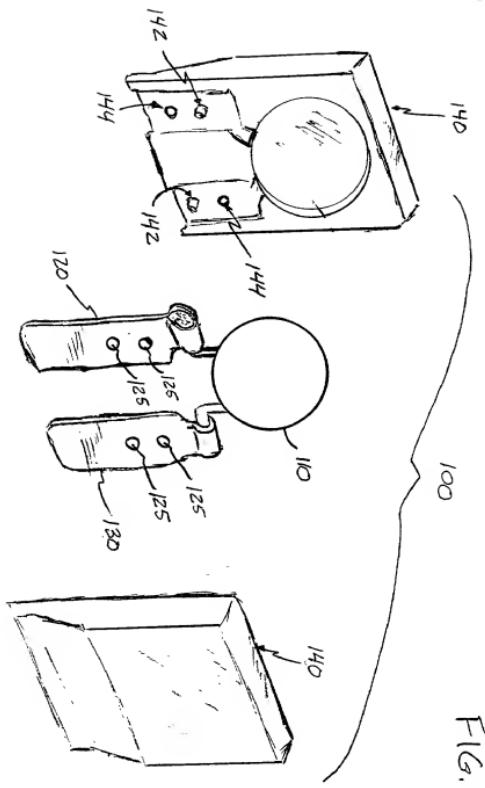


FIG. 2

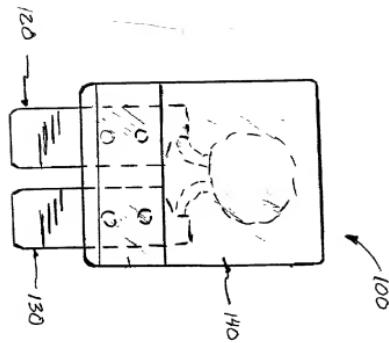
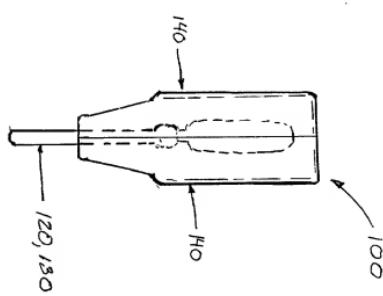


FIG. 3



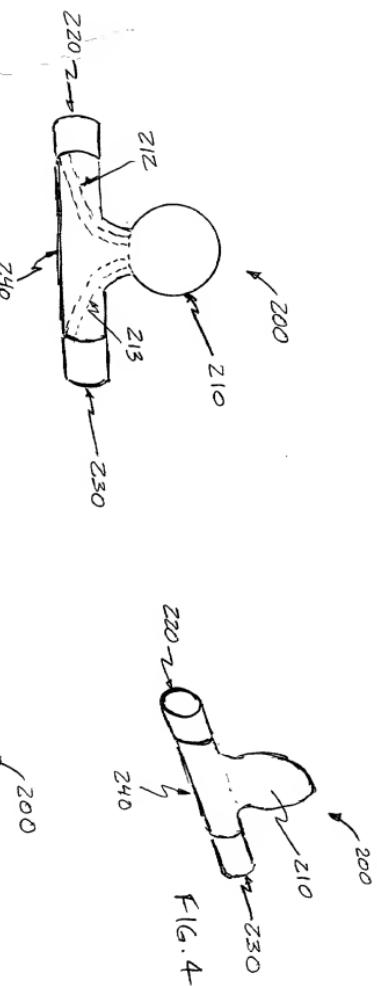


FIG. 5

FIG. 6

FIG. 4

FIG. 8

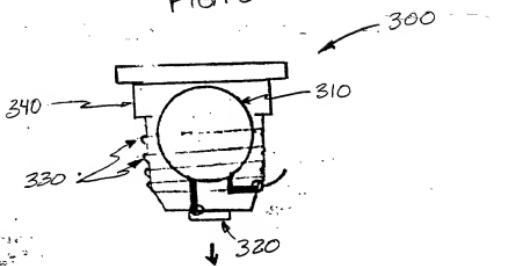


FIG. 7 SECTIONED

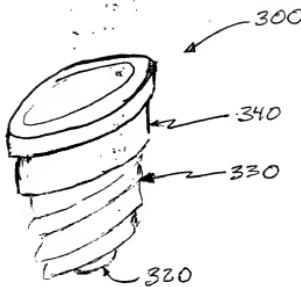


FIG. 7

RE32809 E928750

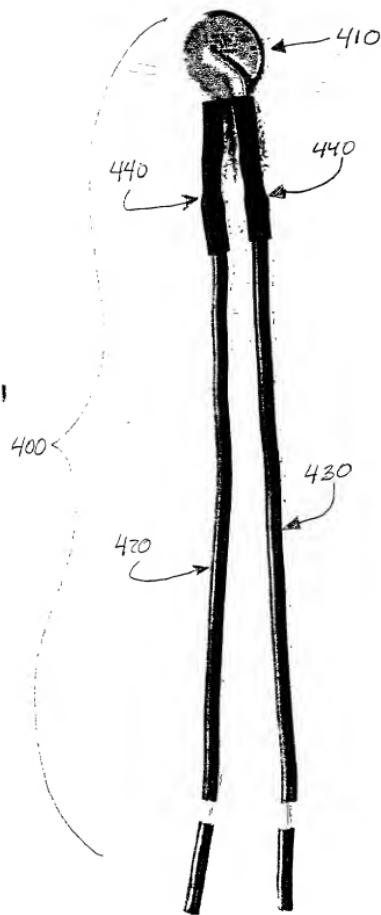


FIG. 9

**STATEMENT CLAIMING SMALL ENTITY STATUS
(37 CFR 1.9(f) & 1.27(b)) -- INDEPENDENT INVENTOR**

Applicant or Patentee: Dennis Mitchell
Application or Patent No.: Unknown
Filed or Issued: Herewith

Title: **DEVICE AND METHOD FOR PROTECTION OF HEATING VENTILATION AND AIR CONDITIONING CONTROL CIRCUITS FROM OVERCURRENTS**

As the below named inventor, I hereby declare that I qualify as an independent inventor as defined in 37 CFR 1.9(c) for purposes of paying reduced fees to the Patent and Trademark Office described in:

- the specification filed herewith with title as listed above.
- the application identified above.
- the patent identified above.

I have not assigned, granted, conveyed or licensed and am under no obligation under contract or law to assign, grant, convey or license, any rights in the invention to any person who would not qualify as an independent inventor under 37 CFR 1.9(c) if that person had made the invention, or to any concern which would not qualify as a small business concern under 37 CFR 1.9(d) or a nonprofit organization under 37 CFR 1.9(e).

Each person, concern or organization to which I have assigned, granted, conveyed or licensed or am under an obligation under contract or law to assign, grant, convey, or license any rights in the invention is listed below:

- No such person, concern or organization exists.
- Each such person, concern or organization is listed below.

FULL NAME:

ADDRESS:

Individual

Small Business Concern

NonProfit Organization

Separate statements are required from each named person, concern or organization having rights to the invention stating their status as small entities. (37 CFR 1.27)

I acknowledge the duty to file, in this application or patent, notification of any change in status resulting in loss of entitlement to small entity status prior to paying, or at the time of paying, the earliest of the issue fee or any maintenance fee due after the date on which status as a small entity is no longer appropriate. (37 CFR 1.28(b)).

I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under section 1001 of Title 18 of the United States Code, and that such willful false statements may jeopardize the validity of the application, any patent issuing thereon, or any patent to which this verified statement is directed.

Dennis Mitchell, Inventor
Dennis Mitchell

DATE: 7-20-98

DECLARATION AND POWER OF ATTORNEY

As a below named inventor, I hereby declare that:

This declaration is of the following type:

(X) original
() design
() supplemental
() national stage of PCT

My residence, post office address, and citizenship are as stated below next to my name, and I believe I am the original, first, and sole inventor (if only one name is listed below) or an original, first and joint inventor (if plural names are listed below) of the subject matter which is claimed and for which a patent is sought on the invention entitled:

"DEVICE AND METHOD FOR PROTECTION OF HEATING VENTILATION AND AIR CONDITIONING CONTROL CIRCUITS FROM OVERCURRENTS"

the specification of which: (check one)

(X) is attached hereto.
() was filed on ** as Application Serial No. ** and was amended on (if applicable)
() was described and claimed in PCT International Application No. -- filed on -- and as amended under PCT Article 19 on -- (if any).

I hereby state that I have reviewed and understand the contents of the above-identified specification, including the claims, as amended by any amendment referred to above.

I acknowledge the duty to disclose all information known to be material to the patentability of any claim in accordance with Title 37, Code of Federal Regulations, §1.56, and which is material to the examination of this application, namely, information where there is a substantial likelihood that a reasonable examiner would consider it important in deciding whether to allow the application to issue as a patent.

I hereby claim foreign priority benefits under Title 35, United States Code, §119 (a)-(d) or § 365 (b) of any foreign application(s) for patent or inventor's certificate, or § 365 (a) of any PCT International application which designated at least one country other than the United States of America, listed below and have also identified below any foreign application for patent or inventor's certificate, or of any PCT International application having a filing date before that of the application on which priority is claimed:

PRIOR FOREIGN APPLICATION(S)

<u>Number</u>	<u>Country</u>	<u>Day/Month/Year Filed</u>	<u>Priority Claimed</u>
---------------	----------------	-----------------------------	-------------------------

- NONE -

This declaration is of the following type: (if applicable)

() divisional
() continuation
() continuation-in-part (CIP)

I hereby claim the benefit under Title 35, United States Code, §120 of any United States application(s), or § 365 (c) of any PCT International application designating the United States of America, listed below and, insofar as the subject matter of each of the claims of this application is not disclosed in the prior United States or PCT International application in the manner provided by the first paragraph of Title 35, United States Code, §112, I acknowledge the duty to disclose material information as defined in Title 37, Code of Federal Regulations, §1.56(a) which occurred between the filing date of the prior application and the national or PCT international filing date of this application:

<u>Number</u>	<u>Country</u>	<u>Day/Month/Year Filed</u>	<u>Priority Claimed</u>
---------------	----------------	-----------------------------	-------------------------

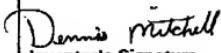
- NONE -

POWER OF ATTORNEY: As a named inventor, I hereby appoint the following attorney(s) and/or agent(s) to prosecute this application and transact all business in the Patent and Trademark Office connected therewith: TRACY W. DRUCE, Reg. No. 35,493; and WILLIAM P. GLENN, Reg. No. 36,526 of the law firm of ROYSTON, RAYZOR, VICKERY, NOVAK & DRUCE, L.L.P. having an office at 2000 Riverview Towers, 111 Soledad, San Antonio, Texas 78205.

SEND CORRESPONDENCE TO:
TRACY W. DRUCE
ROYSTON, RAYZOR, VICKERY,
NOVAK & DRUCE, L.L.P.
2000 Riverview Towers
111 Soledad
San Antonio, Texas 78205

DIRECT TELEPHONE CALLS TO:
TRACY W. DRUCE
210-228-0655

I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code, and that such willful false statements may jeopardize the validity of the application or any patent issued thereon.

	Dennis Mitchell	 Inventor's Signature	8-20-98
1	San Antonio, Texas United States Residence	US	Citizenship
	12127 Jones Maltsberger Road San Antonio, Texas 78316 Post Office Address		

A:\199570\ Mitchell\44353 Declaration and Power of Attorney.mjd